

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1-10. (canceled)

11. (previously presented) A method of forming a double seam between a can body and a can end, said method comprising the steps of:

a) providing a can end having a circumferentially extending peripheral curl and a wall extending circumferentially and radially inward from said curl and an annular reinforcing bead extending radially inward from said wall, said reinforcing bead having an interior surface, said peripheral curl comprising a seaming panel and a radiused portion extending from said seaming panel to said wall, said wall inclined between about 20° and about 60° with respect to an axial centerline of said can end;

b) placing said curl of said can end into contact with a circumferentially extending flange of a can body;

c) providing a rotatable chuck having first and second circumferentially extending walls, said first and second walls forming a juncture therebetween; bringing said chuck into engagement with said can end so that said juncture of said first and second walls of said chuck contacts said inclined wall of said can end;

d) rotating said chuck;

e) performing a first seaming operation by placing a first seaming roll into contact with said can end curl while rotating said can end so as to partially deform said curl and said can body flange into a partial seam, said rotation of said can end during said first seaming operation driven by said rotating chuck through driving contact between said juncture of said first and second walls of said chuck and said inclined wall of said can end without driving contact between said chuck and said can end bead interior surface;

f) performing a second seaming operation by placing a second seaming roll into contact with said partially deformed can end curl so as to further deform said curl and said can body flange so as to further form said seam.

12. (previously presented) The method according to claim 11, wherein said first and second seaming operations reform said can end inclined wall by bending a first portion of said inclined wall upward by an angle of at least about 16°.

13. (previously presented) The method according to claim 11, wherein as a result of said first and second seaming operations said can end inclined wall is reformed so that a first portion of said wall is oriented substantially cylindrically.

14. (previously presented) The method according to claim 11, wherein prior to performing said first seaming operation said wall of said can end is inclined between about 30° and about 50° with respect to said axial centerline of said can end.

15. (previously presented) The method according to claim 14, wherein as a result of said first and second seaming operations said can end inclined wall is reformed so that a first portion of said wall is oriented substantially cylindrically.

16. (previously presented) The method according to claim 14, wherein said first and second seaming operations reform said can end inclined wall by bending a first portion of said inclined wall upward by an angle of at least about 26°.

17. (previously presented) The method according to claim 11, wherein prior to performing said first seaming operation said wall of said can end is inclined between about 40° and about 45° with respect to an axial centerline of said can end.

18. (previously presented) The method according to claim 17, wherein as a result of said first and second seaming operations said can end inclined wall is reformed so that a first portion of said wall is oriented substantially cylindrically.

19. (previously presented) The method according to claim 17, wherein said first and second seaming operations reform said can end inclined wall by bending a first portion of said inclined wall upward by an angle of at least about 36°.

20. (previously presented) The method according to claim 11, wherein said first circumferentially extending wall of said chuck is oriented so as to be substantially cylindrical.

21. (previously presented) The method according to claim 20, wherein said substantially cylindrical first wall of said chuck is oriented so as to be inclined with respect to an axial centerline of said chuck by no more than about 4°.

22. (previously presented) The method according to claim 11, wherein the distance from the lowermost point on said annular bead to the uppermost point on said curl defines a height of said can end, and wherein as a result of said first and second seaming operations said can end inclined wall is reformed so that a first portion of said wall is bent upwardly so as to substantially increase said height of said can end.

23. (previously presented) The method according to claim 11, wherein said chuck second wall is inclined with respect to an axial centerline of said chuck that substantially matches said inclination of said can end wall, and wherein said rotation of said can end during said first seaming operation is aided by driving contact between said second wall of said chuck and said inclined wall of said can end.

24. (previously presented) A method of forming a double seam between a can body and a can end intended for use in packaging a carbonated beverage, said method comprising the steps of:

a) providing a can end having a circumferentially extending peripheral curl and a wall extending circumferentially and radially inward from said curl and an annular reinforcing bead extending radially inward from said wall, said peripheral curl comprising a seaming panel and a radiused portion extending from the seaming panel to said wall, said wall inclined between about 20° and about 60° with respect to an axial centerline of said can end;

b) placing said curl of said can end into contact with a circumferentially extending flange of a can body;

- c) providing a rotatable chuck having first and second circumferentially extending walls, said first wall being substantially cylindrical;
- d) bringing said chuck into engagement with said can end;
- e) performing a seaming operation by placing one or more seaming rolls into contact with said curl of said can end while said can end rotates so as to deform said curl and said can body flange into a seam, said seaming operation deforming said can end inclined wall into distinct first and second portions, said first wall portion being reformed so as to be substantially cylindrical, said second wall portion remaining inclined between about 20° and about 60° with respect to said axial centerline.

25. (previously presented) The method according to claim 24, wherein during said seaming operation said can end inclined wall first portion is reformed by bending said first portion upward by an angle of at least about 16° .

26. (previously presented) The method according to claim 24, wherein said wall of said can end is inclined between about 30° and about 50° with respect to an axial centerline of said can end.


27. (previously presented) The method according to claim 26, wherein during said seaming operation said can end inclined wall first portion is reformed by bending said first portion upward by an angle of at least about 26° .

28. (previously presented) The method according to claim 24, wherein said wall of said can end is inclined between about 40° and about 45° with respect to an axial centerline of said can end.

29. (previously presented) The method according to claim 28, wherein during said seaming operation said can end inclined wall first portion is reformed by bending said first portion upward by an angle of at least about 36° .

30. (previously presented) The method according to claim 24, wherein said substantially cylindrical first wall of said chuck is oriented so as to be inclined with respect to an axial centerline of said chuck by no more than about 4°.

31. (previously presented) The method according to claim 24, wherein the distance from the lowermost point on said annular bead to the uppermost point on said curl defines a height of said can end, and wherein as a result of said seaming operation said can end inclined wall is reformed so that said first portion of said wall is bent upwardly into said substantially cylindrical orientation so as to substantially increase said height of said can end.



32. (previously presented) The method according to claim 24, wherein

- f) said annular bead has an interior surface thereof;
- g) said first and second walls of said chuck form a juncture therebetween;
- h) said seaming operation comprises (i) performing a first seaming operation by placing a first seaming roll into contact with said can end curl while said can end is rotated so as to partially deform said curl and said can body flange into a partial seam, and (ii) performing a second seaming operation by placing a second seaming roll into contact with said partially deformed can end curl so as to further deform said curl and said can body flange so as to further form said seam;
- i) said rotation of said can end during said first seaming operation is accomplished by imparting driving contact between said juncture of said first and second walls of said chuck and said inclined wall of said can end but without imparting driving contact between said chuck and said can end bead interior surface.

33. (previously presented) The method according to claim 24, further comprising the step of filling the can body with a carbonated beverage prior to performing said seaming operation.

34. (previously amended) A method of forming a double seam between a can body and a can end, said method comprising the steps of:

a) providing a can end having a circumferentially extending inclined wall and a peripheral curl extending circumferentially and radially outward from said inclined wall, said peripheral curl comprising a seaming panel and a radiused portion extending from the seaming panel to said inclined wall, said wall inclined between about 20° and about 60° with respect to an axial centerline of said can end;

b) placing said curl of said can end into contact with a circumferentially extending flange of a can body;

c) providing a rotatable chuck having first and second circumferentially extending walls, said first wall being substantially cylindrical;

d) bringing said chuck into engagement with said can end;

e) performing a seaming operation by placing one or more seaming rolls into contact with said curl of said can end so as to deform said curl and said can body flange into a seam, a first portion of said inclined can end wall being pressed against said chuck first wall, whereby said first portion of said inclined can end wall is bent upward through an angle of at least about 16° so as to reform said can end wall into distinct first and second portions, said second wall portion remaining inclined between about 20° and about 60° with respect to said axial centerline.

35. (previously presented) The method according to claim 34, wherein said wall of said can end is inclined between about 30° and about 50° with respect to said axial centerline of said can end.

36. (previously presented) The method according to claim 35, wherein during said seaming operation said can end inclined wall first portion is reformed by bending said first portion upward by an angle of at least about 26°.

37. (previously presented) The method according to claim 34, wherein said wall of said can end is inclined between about 40° and about 45° with respect to said axial centerline of said can end.

38. (previously presented) The method according to claim 37, wherein during said seaming operation said can end inclined wall first portion is reformed by bending said first portion upward by an angle of at least about 36°.

39. (previously presented) The method according to claim 34, wherein the distance from the lowermost point on said annular bead to the uppermost point on said curl defines a height of said can end, and wherein said upward bending of said first portion of can end inclined wall during said seaming operation substantially increase said height of said can end.

40. (previously presented) The method according to claim 34, wherein

- f) said can end comprises an annular reinforcing bead extending radially inward from said inclined wall, said annular bead having an interior surface thereof;
- g) said first and second walls of said chuck form a juncture therebetween;
- h) said seaming operation comprises (i) performing a first seaming operation by placing a first seaming roll into contact with said can end curl while said can end is rotated so as to partially deform said curl and said can body flange into a partial seam, and (ii) performing a second seaming operation by placing a second seaming roll into contact with said partially deformed can end curl so as to further deform said curl and said can body flange so as to further form said seam;
- i) said rotation of said can end during said first seaming operation is accomplished by imparting driving contact between said juncture of said first and second walls of said chuck and said inclined wall of said can end but without imparting driving contact between said chuck and said can end bead interior surface.

41. (previously presented) The method according to claim 34, further comprising the step of filling the can body with a carbonated beverage prior to performing said seaming operation.

42. (withdrawn) An apparatus for seaming a peripheral curl of a can end onto a flange of a can body, said can end having a wall extending radially inward from said cover hook and inclined between about 20° and about 60° with respect to a central axis of said can end, comprising:

a) a chuck adapted to hold said can end on said can body, said chuck comprising upper and lower circumferentially extending walls forming a juncture therebetween, said lower wall inclined between about 20° and about 60° with respect to a central axis of said chuck, said upper wall being substantially cylindrical; and

b) at least one seaming roll adapted to urge an upper portion of said inclined wall of said can end against said upper wall of said chuck so as to deform said peripheral curl and said flange into a seam joining said can end to said can body.

43. (withdrawn) The apparatus according to claim 42, wherein said substantially cylindrical wall is inclined with respect to said central axis by not more than about 4°.

44. (withdrawn) The apparatus according to claim 42, wherein said lower wall of said chuck is inclined between about 30° and about 50° with respect to said central axis of said chuck.

45. (withdrawn) The apparatus according to claim 44, wherein said lower wall of said chuck is inclined between about 40° to about 45° with respect to said central axis of said chuck.

46. (withdrawn) An apparatus for seaming a can end onto a flange of a can body, said can end having a circumferentially extending peripheral curl and a wall extending circumferentially and radially inward from said curl and an annular reinforcing bead extending radially inward from said wall, said reinforcing bead having an interior surface, said peripheral curl comprising a seaming panel and a radiused portion extending from said

seaming panel to said wall, said wall inclined between about 20° and about 60° with respect to an axial centerline of said can end, comprising:

a) a chuck for holding said can end on said can body, said chuck comprising (i) upper and lower circumferentially extending walls forming a juncture therebetween, said lower wall inclined between about 20° and about 60° with respect to a central axis of said chuck, said upper wall being substantially cylindrical, and (ii) a downwardly extending annular bead, said chuck annular bead sized and located so as not to contact said inner interior surface of said chuck annular reinforcing bead when said chuck holds said can end on said can body; and

b) at least one seaming roll adapted to urge an upper portion of said inclined wall of said can end against said upper wall of said chuck so as to deform said peripheral curl and said flange into a seam joining said can end to said can body.

47. (withdrawn) The apparatus according to claim 46, wherein said substantially cylindrical wall is inclined with respect to said central axis by not more than about 4°.

48. (withdrawn) The apparatus according to claim 46, wherein said lower wall of said chuck is inclined between about 30° and about 50° with respect to said central axis of said chuck.

49. (withdrawn) The apparatus according to claim 48, wherein said lower wall of said chuck is inclined between about 40° to about 45° with respect to said central axis of said chuck.

50. (withdrawn) The apparatus according to claim 46, wherein said lower wall of said chuck is adapted to drive rotation of said can end and said can body while said chuck holds said can end onto said can body.

51. (withdrawn) The apparatus according to claim 46, wherein said juncture between said upper and lower walls of said chuck is adapted to drive rotation of said can end and said can body while said chuck holds said can end onto said can body.

52. (withdrawn) A method of seaming a can end to a can body, comprising the steps of:

a) providing a can end having (i) a circumferentially extending peripheral curl, said peripheral curl forming a lip at one end thereof, (ii) a circumferentially extending wall extending downwardly and radially inwardly from an opposite end of said peripheral curl, at least an upper portion of said wall inclined with respect to an axial centerline of said can end, and (iii) a circumferentially extending annular bead extending downwardly and radially inwardly from said wall, the distance from the lowermost point on said bead to the uppermost point on said curl defining a height of said can end;

b) placing said peripheral curl of said can end into contact with a circumferentially extending flange of a can body;

c) bringing a rotatable chuck into engagement with said can end;

d) bringing a seaming roll having a lower forming surface into rolling engagement with said curl, said seaming roll being positioned so that said lower forming surface is disposed above said lip of said curl upon initial engagement with said curl so that said seaming roll (i) displaces said curl upwardly as said curl is displaced inwardly and (ii) permanently bends said upper portion of said can end wall towards the axial direction so as to permanently increase said height of said can end.

53. (withdrawn) The method of claim 52, wherein at least said upper portion of said wall is inclined between about 20° and about 60° with respect to said axial centerline prior to bending of said upper wall portion of said can end.

54. (withdrawn) The method of claim 53, wherein at least said upper portion of said wall is inclined between about 30° and about 50° with respect to said axial centerline prior to bending of said upper wall portion of said can end.

55. (withdrawn) The method of claim 54, wherein at least said upper portion of said wall is inclined between about 40° and about 45° with respect to said axial centerline prior to bending of said upper wall portion of said can end.

56. (withdrawn) The method according to claim 53, wherein said bending of said upper portion of said can end wall forms a crease between said upper portion of said can end wall and a lower portion of said can end wall.

57. (withdrawn) The method of claim 52, wherein the rotatable chuck has first and second circumferentially extending walls, the first wall being substantially cylindrical, and wherein said bending of said upper portion of said can end wall causes said upper portion of said can end wall to be pressed against said chuck first wall, whereby said upper portion of said can end wall becomes substantially cylindrical.

58. (withdrawn) The method according to claim 57, wherein at least said upper portion of said can end wall is inclined between about 20° and about 60° with respect to said axial centerline prior to bending of said upper wall portion of said can end.

59. (withdrawn) The method according to claim 58, wherein at least said upper portion of said can end wall is inclined between about 30° and about 50° with respect to said axial centerline prior to bending of said upper wall portion of said can end.

60. (withdrawn) The method according to claim 59, wherein at least said upper portion of said can end wall is inclined between about 40° and about 45° with respect to said axial centerline prior to bending of said upper wall portion of said can end.

61. (withdrawn) A method of seaming a can end to a can body, comprising the steps of:

- a) providing a can end having (i) a circumferentially extending peripheral curl, (ii) a circumferentially extending wall extending downwardly and radially inwardly from an opposite end of said peripheral curl, and (iii) a circumferentially extending

annular bead extending downwardly and radially inwardly from said wall, said bead having inner and outer walls and a substantially convex base so as to form an interior surface thereof having a bottom;

b) placing said curl of said can end into contact with a circumferentially extending flange of a can body;

c) bringing a rotatable chuck into engagement with said can end;

d) performing at least a first seaming operation, said first seaming operation comprising placing a seaming roll into contact with said can end curl while rotating said can end so as to partially deform said curl and said can body flange into a partial seam, said rotation of said can end during said first seaming operation driven by said rotating chuck through driving contact between said chuck and said wall of said can end without driving contact between said chuck and said base of said can end bead interior surface.

62. (withdrawn) The method of claim 61, wherein an upper portion of said can end wall is inclined at an angle to an axial centerline of said can end prior to said seaming operation, and further comprising a second seaming operation that bends said wall upper portion into an approximately cylindrical shape.

63. (withdrawn) The method according to claim 62, wherein said upper portion of said can end wall is inclined between about 20° and about 60° with respect to said axial centerline of said can end prior to said first seaming operation.

64. (withdrawn) The method according to claim 63, wherein said upper portion of said can end wall is inclined between about 30° and about 50° with respect to said axial centerline of said can end prior to said first seaming operation.

65. (withdrawn) The method according to claim 64, wherein said upper portion of said can end wall is inclined between about 40° and about 45° with respect to said axial centerline of said can end prior to said first seaming operation.

DOCKET NO.: CC-3397;4772US4
Application No.: 10/024,862
Office Action Dated: July 3, 2003

PATENT

66. (withdrawn) The method according to claim 63, wherein said upper portion of said wall is bent towards the axial direction so as to permanently increase the height of said can end during said first and second seaming operations.

67. (withdrawn) The method according to claim 63, wherein said rotation of said can end during said first seaming operation is driven by said rotating chuck through driving contact between said chuck and said wall of said can end without driving contact between said chuck and any portion of said can end bead interior surface.
